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(54) Fluid dispense system

(57) Disclosed herein is a dispense valve for a negative pressure dispense system wherein the assembly (12) seals a container (18) and has valves (26,52) for ingress of ambient air and valves (38,52) for egress of dispensed fluid respectively. The assembly (12) has a one-way valve (96,98) fitted in the air flow path to prevent fluid from leaking out of the container through the air valve (26,52) when the container is breached.

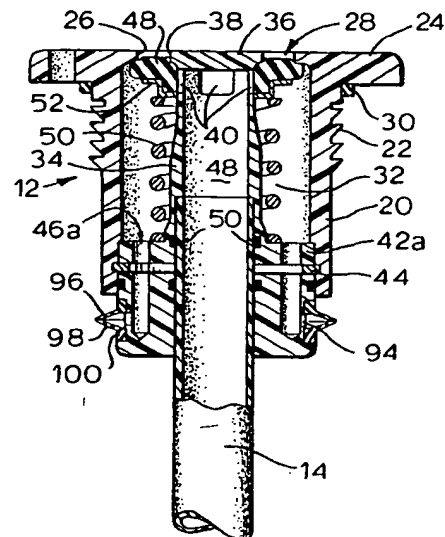


FIG.3

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Description

This invention relates to a fluid coupling for dispensing fluids from containers; and especially relates to a dispense valve assembly for such a fluid coupling.

There is a class of fluid dispense systems employing negative pressure dispensation of fluids from containers, such as expensive or hazardous liquid chemicals, the container being fitted with a dispense valve assembly that is to be mated with a coupling at a point of use to enable the fluid to be pumped from the container; for example, as described in International Patent Specification No. WO 88/06693 (The Mogul Corporation).

There is also a class of fluid dispense systems employing positive pressure dispensation of fluids from containers, such as gas pressure dispensing of beer from kegs. Known keg beer dispense systems comprise a dispense valve assembly having a valve member spring-loaded to normally close an annular outlet port in the top of a valve body, that is fitted into the neck of a beer keg. A coupling head has a body to engage the top of the dispense valve body and an internal reciprocating member movable downwardly of the coupling head to seal with and force down the dispense valve body member and thereby open the valve and define a central outlet and a concentric inlet for the dispense valve assembly. The coupling head also has a beer outlet line connected to the central outlet, via the slideable member, and an inlet for pressurised gas to connect with the concentric port, via a gas passage between the coupling head body and the slideable member. The dispense valve assembly has to seal both the gas inlet annulus and the beer outlet port when the coupling head is disconnected from the keg dispense valve assembly and the coupling head has to seal the pressure gas inlet when it is disconnected from keg dispense valve assembly. It is an object of the present invention to provide a dispense valve assembly for a

negative pressure dispense system that is simple and safe to use and which prevents leakage of dispensed fluid wherever possible.

According to the present invention, a dispense valve assembly for a negative pressure fluid dispense system the assembly sealing a container and having valves, for

ingress of ambient air and egress of dispensed fluid respectively wherein the assembly has a valve body and a one-way valve is provided in the body to, in use, permit ambient air to flow into the container from the ambient air valve and to prevent fluid from flowing back into the valve body and leaking outside the container when broached.

According to an embodiment of the present invention, the dispense valve assembly is arranged to be fitted into the neck of a fluid container and has a valve member spring-loaded to normally close an annular outlet port in the top of the valve body, to define and seal

a central fluid outlet and form a concentric air inlet for the dispense valve assembly.

The present invention also differs from the aforementioned Mogul coupling which does not have a dispense valve assembly, relying on a screw cap 60 for container sealing.

By this means, escape of fluid along the input air flow path is prevented should the broached container be overturned. The dispense valve assembly completely seals the container whenever a coupling head is not coupled.

According to another embodiment of the present invention, the dispense valve body includes an internal port or ports that, in use, form the sole route for ambient air to flow into the container from the concentric ambient air inlet valve, a non-return valve being fitted in the or each port.

According to a still further embodiment of the present invention, the dispense valve assembly has a spear descending from the dispense valve body to the bottom of the container and the bottom end of the spear is provided with an axially slideable sleeve to contact the container bottom. By this means, almost the entire contents of the container can be dispensed and this is very significant for expensive chemicals. Preferably, the lower end of the spear sleeve is notched or otherwise shaped to provide for passage of fluid into the spear between the lower end of the sleeve and the container bottom. Advantageously, the bottom of the container is provided with a sump in the region of the spear sleeve to further assist complete dispensation of fluid.

In a preferred embodiment of the present invention, the dispense valve assembly is mainly comprised of moulded plastics components. The pressures to which negative pressure dispense systems are exposed are significantly lower than for positive pressure dispense systems and thus lower strength materials can be employed; with considerable cost savings. Cost saving is not simply for commercial gain. The most common means for dispensing liquid chemicals is simply by removing a bung from a drum of chemicals and introducing a pipe attached to a pump. This is clearly hazardous. However, to successfully compete with this common practise, dispense valve assemblies in accordance with the present invention will have to be relatively inexpensive otherwise they will not be used in spite of their safety benefits.

The above and other features of the present invention are illustrated, by way of example, by the Drawings, wherein:-

- Fig.1 is a part sectioned elevation of a coupling head coupled to a drum lance in accordance with the present invention and broaching a drum lance;
- Fig.2 is a similar view of the coupling head of Fig.1, but when uncoupled; and
- Fig.3 is a sectional view of a modified dispense

valve assembly for the drum lance of Fig. 1.

As shown by Figs 1 and 2, a lance 10, consisting of a dispense valve 12 and a descending spear 14, is screwed into the neck 16 of a drum 18.

The dispense valve assembly 12 comprises a generally cylindrical body 20, formed of high density polyethylene, having an external thread 22 to mate with the threaded drum neck 16. The top of the dispense valve body 20 has a radially outwardly extending, integral flange 24 which has an inner circular rim 26 defining the outer peripheral valve seat of an annular valve port 28. A sealing ring 30 is trapped under the valve flange 24 and against the mouth of the drum neck 16. The shape of the outer rim of the valve flange depends upon the coupling head to which the dispense valve assembly is to be coupled; in this example the rim is circular, but it could be tri-lobal, hexagonal etc. The shape of the flange may be keyed to the chemical to be dispensed; thus providing against dispensing the wrong chemical as each shape of flange can only couple to the complementary coupling head.

A core 32, also formed of high density polyethylene, is fitted within the dispense valve body, the core has a central, hollow pillar 34 closed at the top by an integral cap 36 that is coplanar with the valve flange 24. The outer, circular rim 38 of the cap defines the inner peripheral seat of annular valve port 28. Ports 40 are provided in the side walls of the core pillar 34, which side walls flare radially outwardly beneath the core pillar ports. The bottom of the core pillar has a radially outwardly extending, annular integral flange 42 with a circular outer periphery that fits within the dispense valve body 20 and is retained therein by a circlip 44. The core flange 42 has a series of axial ports 46 and a central bore 48 into the bottom of which the spear 14 is push fitted, the spear being formed by a tube of polyvinylchloride that descends to the bottom of the drum 18. An O-ring 50 in the central pillar bore 48 seals and helps to retain the spear in the pillar.

A ring poppet valve 52, formed of Ethylene Propylene Diamene Monomer (EPDM), is located about the core pillar under the cap 36 and is loaded there against by a stainless steel coil spring 54, that encircles the core and is trapped between the core flange 40 and a stainless steel seating plate 56 supporting the poppet valve. The poppet valve 52 therefore normally closes the annular valve port 28, sealing against the outer valve seat 26 and the inner valve seat 38; the seating plate 56 prevents the poppet valve from being forced through the valve port. Poppet valve 52 also seals core pillar ports 40, when the valve is closed.

A coupling head 58 has a generally cylindrical body 60, formed of high density polyethylene, with a central bore 62 which has a bottom portion 64 of wider diameter than the top portion. The bottom of the coupling head valve body 60 has a radially outwardly extending, integral flange 66 with, in the example, a circular outer

rim. A diametral half of the rim has a depending axial extension 68 with an inturned lip 70, such that the coupling head flange 66 can be slide sideways over the dispense valve flange 24 until the coupling head axial extension abuts part of the rim of the dispense valve flange and the coupling head lip 70 engages under the dispense valve flange rim.

The coupling head has a central tubular member 72, also formed of high density polyethylene, the lower portion of the tubular member is of larger diameter than the upper portion and is a sliding fit within the coupling head body. The tubular member 72 is operated by a handle 74 pivoted to the coupling head body and slidingly engaging the tubular member 72 after it emerges from the top of the coupling head body. The handle can be latched in an upper, uncoupled, position and a lower, coupled, position by a spring-loaded trigger 76; itself pivoted to the handle and latching to upper and lower detents 78, 80 on the coupling head body. Both handle and trigger are formed of high density polyethylene.

Releasing the trigger and pivoting the handle downwards forces the tubular member 72 down out of the coupling head body so that the mouth 82 of the tubular member can engage the dispense poppet valve 52. The mouth 82 of the tubular member has an inturned lip 84 against which a dry break seal valve member 86, formed of Ethylene Propylene Diamene Monomer, is loaded by a stainless steel coil spring 88 housed within a relieved cylindrical recess 90 within the tubular member.

When the downwards stroke of handle 74 has been completed and the handle latched in the coupled position, the mouth 82 of the tubular member will have forced the poppet valve 48 down the central pillar 34, exposing the ports 40 and engaging and sealing with the flared pillar side walls. Tubular member mouth 82 also seals against the poppet valve and the cap 36 on the dispense valve central pillar will have contacted the dry break seal valve member 86 and lifted it off its seat 84.

With the drum broached, i.e. the dispense valve assembly opened by the coupled and operated coupling head; a output fluid path (shown by large, shaded arrows in Fig.1) is created from the bottom of the spear 14, up the spear into the central pillar 34, out of the pillar ports 40, into the tubular member mouth 82, through the dispense valve annular port 28, past the dry break valve 86 and into the upper portion of the tubular member 72. An output line to a pump (neither shown) can be attached to the threaded top 92 of the tubular member.

The necessary path for inflow of air (indicated by the slim, dark arrows in Fig.1) is provided via the interface between the dispense valve flange 24 and the coupling head flange 66. The depth of the axial extension 68 is greater than the thickness of the dispense valve flange 24 so that, when the coupling head is coupled to the dispense valve assembly and the handle operated; the reaction between the coupling head tubular member

72 and the dispense valve spring 52 will lift the coupling head away from the dispense valve assembly until prevented by the coupling head lip 70. A gap will be created between the two flanges, permitting air to flow there between, down through the dispense valve annular port 28 about the tubular member 72, into the dispense valve 20 and out through axial ports 46 into the air space at the top of the drum 18.

Fig. 3 also shows a modified core flange 42^a, having an increased axial depth, ports 46 are now blind bores 46^a which communicate with radial bores 94 that lead to the outer surface of the flange. A pair of face-to-face, flexible diaphragms 96, 98 are located in a peripheral groove 100 of the flange; into which groove the radial bores 94 emerge. The diaphragms form a non-return valve, permitting air to flow into the drum through bores 46^a, 94 but preventing any fluid in the drum from flowing back into the valve body 20 and leaking outside the broached drum. This positioning of the non-return valves is important because the non-valves prevent the valve body from filling with fluid when the drum is closed. The dispense valve 52 will prevent leakage but, without the non-return valves, the valve body could fill with fluid in transit and this fluid could leak once the drum had been broached.

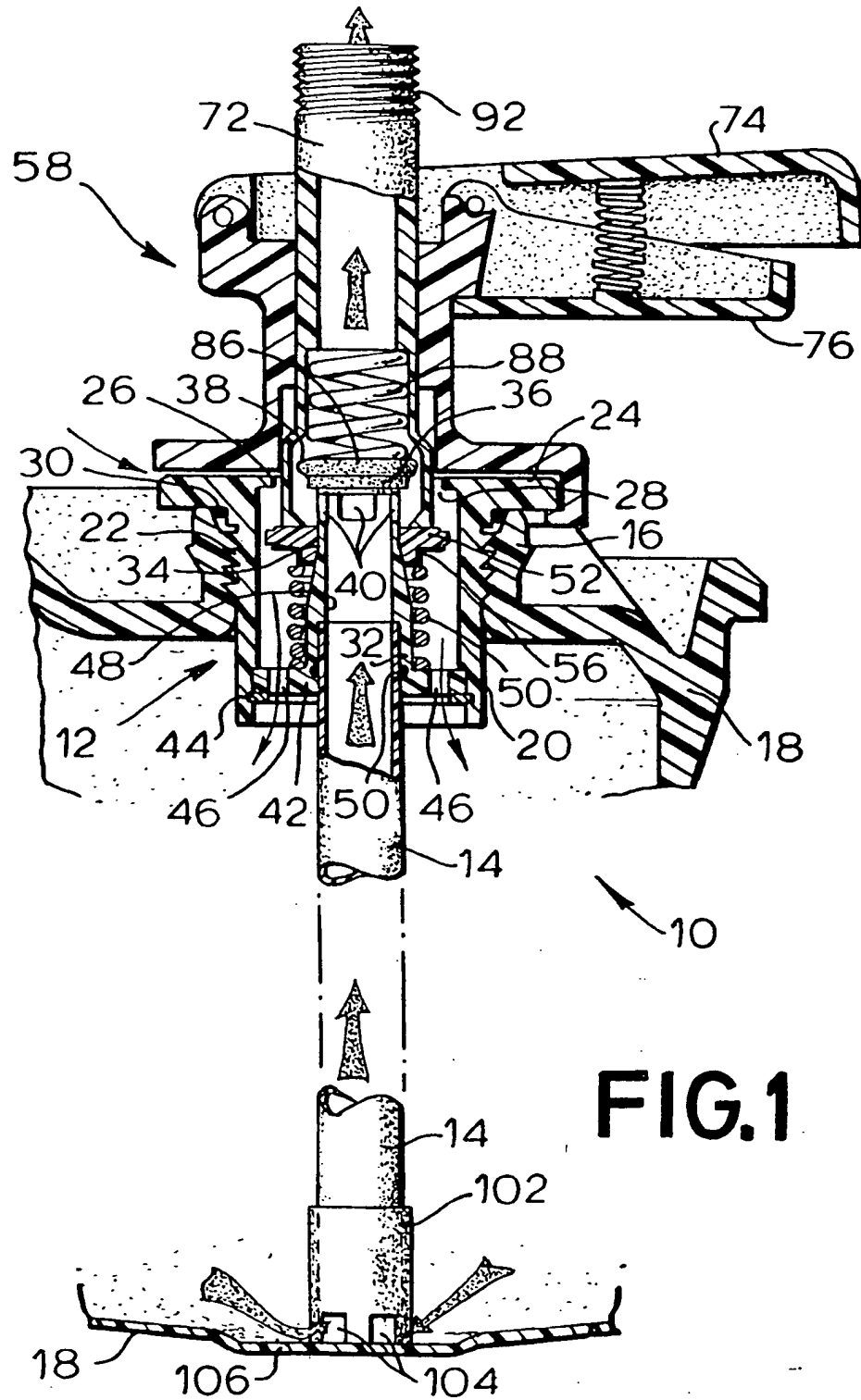
The lower end of the spear may be provided with a sleeve 102, that is a simple sliding fit on the spear end. Notches 104 are provided in the bottom rim of the sleeve to enable fluid to flow into the spear. This axially adjustable sleeve enable the bottom of the drum to be contacted, the lance being fitted into the drum with the sleeve fully extended, contact with the drum bottom sliding the sleeve up the spear as the dispense valve assembly is screwed into the drum neck so that the sleeve remains in contact with the drum bottom. Advantageously, the drum has a sump 106 in the region of the spear sleeve, to assist collection and dispensing of all the drum contents.

Claims

1. A dispense valve assembly for a negative pressure fluid dispense system wherein the assembly (12) seals a container (18) and has valves (26, 52) for ingress of ambient air and (38, 52) for egress of dispensed fluid respectively characterised in that the assembly (12) has a one-way valve (96, 98) provided in the valve body (20) to, in use, permit ambient air to flow into the container (18) from the ambient air valve (26, 52) and to prevent fluid from flowing back into the valve body and leaking outside the container when broached
2. A dispense assembly as claimed in claim 1 and further characterised in that the dispense valve assembly (12) is arranged to be fitted into the neck (16) of a fluid container (18) and has a valve member (52) spring-loaded to normally close an annular

outlet port (28) in the top of the valve body (20), to define and seal a central fluid outlet (38) and form a concentric air inlet (26) for the valve assembly.

3. A dispense valve assembly as claimed in claim 2, and further characterised in that the dispense valve body (20) includes an internal port or ports (94) that, in use, form the sole route for air to flow into the container (18) from the concentric air inlet valve (26), a non-return valve (96, 98) being fitted in the or each port.
4. A dispense valve assembly as claimed in any of claims 1 to 3, and further characterised in that the dispense valve assembly (12) has a spear (14) depending from the dispense valve body (20) to the bottom (106) of the container (18) and the bottom end of the spear is provided with an axially slideable sleeve (102) to contact the container bottom.
5. A dispense valve assembly as claimed in any of claims 1 to 4, and further characterised in that the dispense valve assembly (12) is mainly comprised of moulded plastics components.



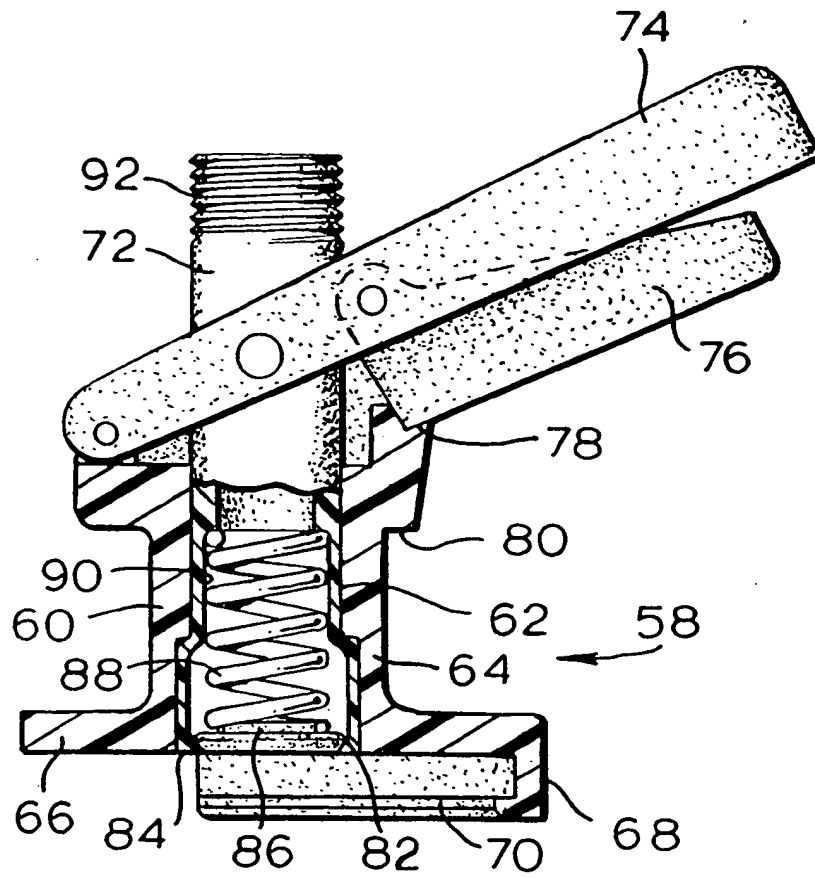
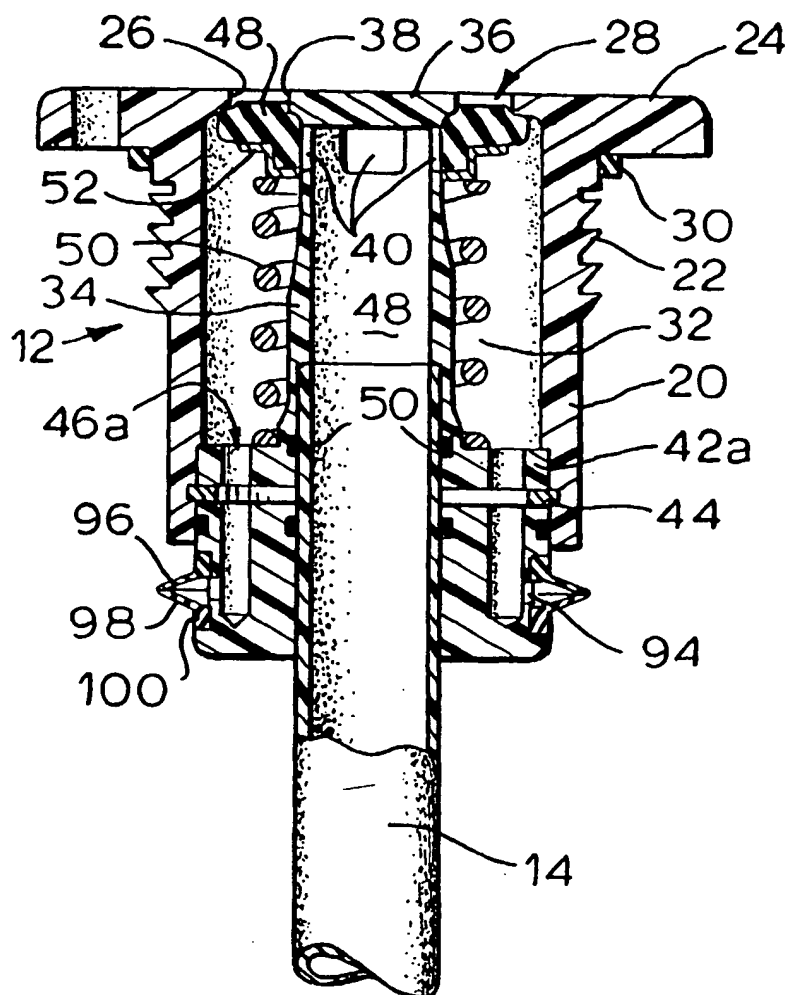


FIG. 2

**FIG.3**

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EUROPEAN SEARCH REPORT

Application Number
EP 98 11 6547

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	DE 20 13 569 A (ALUMASC LTD) 1 October 1970 * the whole document *	1-5	B67D1/08 B67D5/02
Y	US 3 361 152 A (E. AKERS) 2 January 1968 * column 2, line 19 - column 4, line 15 * * figures 2,4,6 *	1-5	
Y	GB 914 091 A (WATNEY MANN LTD) * page 2, line 104 - line 112 * * figure *	4	
Y	EP 0 298 376 A (J. BADERI) 11 January 1989 * column 3, line 50 - column 4, line 2 * * figures 1-4 *	5	
A	US 3 410 458 A (M. JOHNSTON) 12 November 1968 * column 4, line 14 - column 7, line 65 * * figures 1-4 *	1-5	
A	US 3 868 049 A (M. JOHNSTON) 25 February 1975 * column 4, line 26 - column 7, line 42 * * figures 1-4 *	1-4	TECHNICAL FIELDS SEARCHED (Int.Cl.6) B67D
A	DE 23 26 081 A (MCCANN'S ENGINEERING & MFG. CO.) 27 June 1974 * page 2, line 24 - page 4, line 18 * * page 5, line 32 - page 6, line 27 * * figures 2,3 *	1,4	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 November 1998	Examiner Smolders, R
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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